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BY S. B. SHAW.

ELECTRIFICATION OF THE OREGON PORTLAND CEMENT COMPANY.
BY D. C. FINDLAY.

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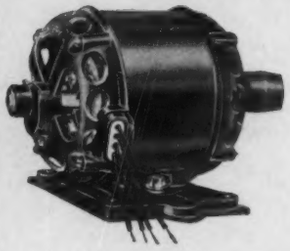

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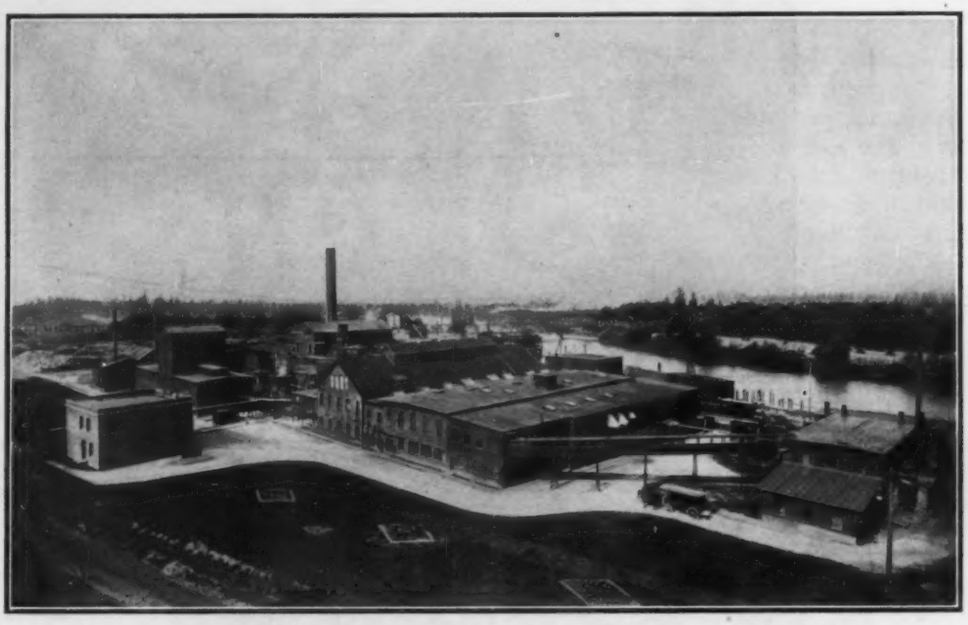
THE EVERETT PULP AND PAPER COMPANY'S PLANT

BY L. E. CHILDS.

(This interesting account of the process of making paper is suggestive of the great field for application of electric power offered by the industry, not only in the machine drive but in the manufacture of chemicals employed. This article is reprinted from the Puget Sound Electric Journal of the Puget Sound Traction, Light & Power Co., Seattle.—The Editor.)

There are five paper mills in the State of Washington. One of the largest is that of the Everett Pulp and Paper Company, at Everett. This company employs some 200 people, and the plant represents an investment of $750,000.



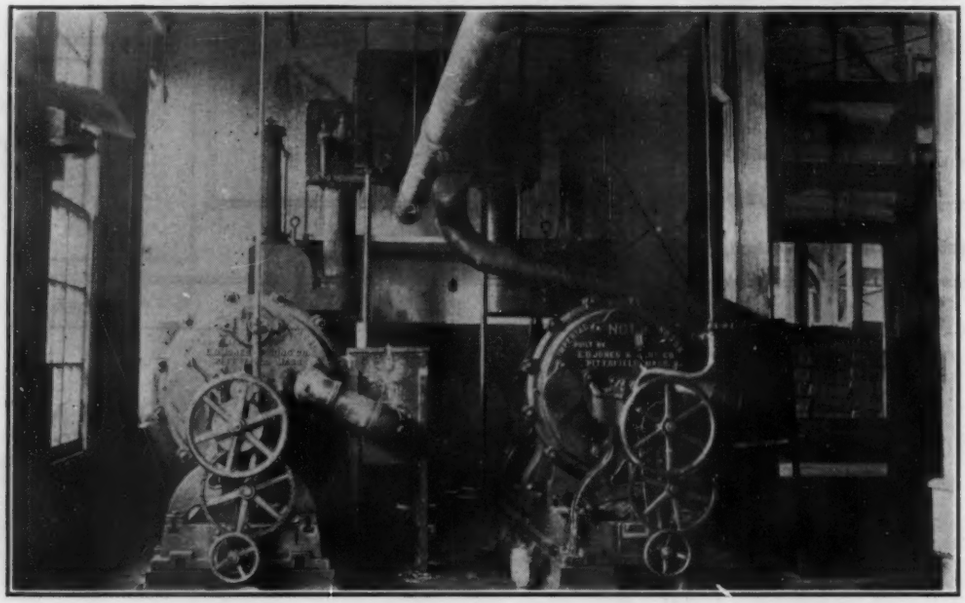
General View Everett Pulp & Paper Company's Plant at Everett, Washington.

The raw material used by the mill is Douglas fir, spruce and cottonwood. It is treated by the soda or alkali process.

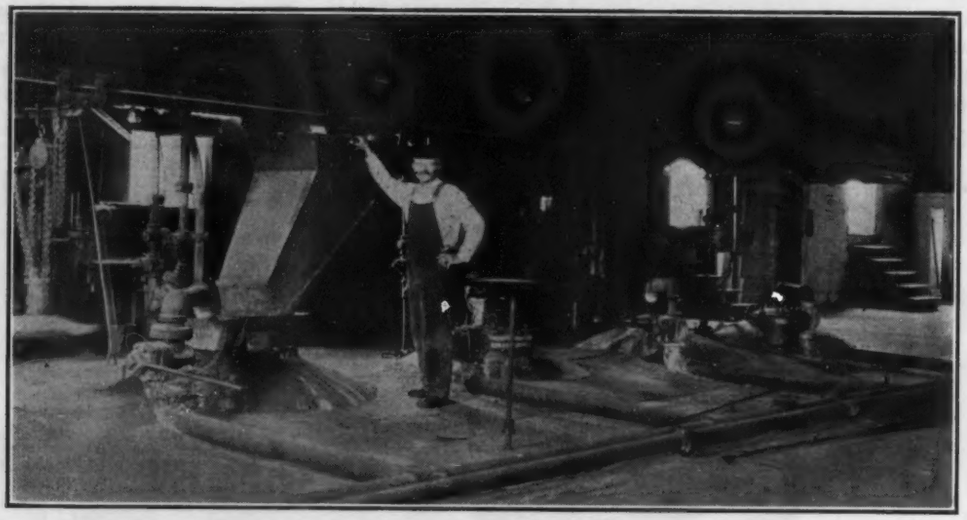
While the company has thousands of acres of timber lands, the wood now used is purchased. Most of the spruce and cottonwood comes from the Grays Harbor country, but the fir is obtained in Snohomish county.

Nearly all the cord wood is delivered at the mill in 4½ ft. lengths, and this wood is piled in high piles in the woodyard. The supply obtained in long form is sawed into cord wood lengths by a drag saw, and split into smaller pieces with a steam splitter. All material must be from sound timber, and no wood is accepted from which the bark was not taken during the peeling season, as a small quantity of bark will make specks in the paper. Throughout the woodyard is a narrow gauge track on which the wood cars, holding 1½ cords of wood, are hauled to the sorting trough. It is here the different species are mixed in desired proportions according to the grade of paper to be made.

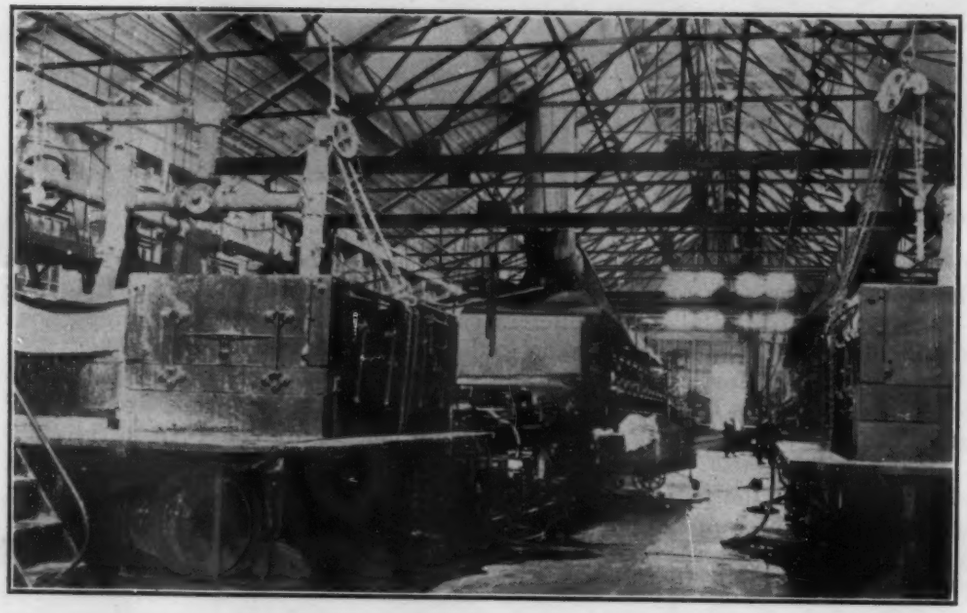
The sticks passing through the trough on an endless chain, under showers of hot water to wash off all dirt and foreign matter, are conveyed to the chipper room. They are then dropped against knives set into the face of a heavy, rapidly revolving steel disc, and are cut into chips at the rate of one cord in ten minutes. These chips, about five-eighths of an inch long are then screened to remove sawdust and con-



200 h.p. Motor Driven Jordans.



Digester Room. Filling Digesters from Bins.



Paper Machines. Stock Chests in Foreground.

veyed to bins in the digester room, to be cooked in caustic soda liquor.

The plant has six digesters, each a seamless steel boiler, cylindrical in shape, 7 ft. in diameter and 28 ft. high, with curved conical top and bottom.

The charging of both wood and liquor is done from the top. A steam inlet also enters from the top, and when the digester is completely filled with wood and liquor the manhole cover is put in place and the steam turned on (boiler pressure 120 pounds). Cooking continues about nine hours under this pressure, the soda solution dissolving the gums and resinous matter, leaving the former chips a mass of pure cellulose. This mass is discharged into a large steel tank with perforated bottom, where the pulp is washed with boiling water to remove all traces of soda solution. The liquor is now of a dark brown color, due to pitch extracted from the wood. The pulp, still retaining all impurities and undigested pieces of wood, is pumped from the washing tanks to a series of screens and riffle-boxes where sand, knots, ets., are removed.

After passing over a decker to remove a greater part of the remaining water, the pulp is conveyed to the bleaching tanks. A solution of chloride of lime is used to bleach the fibres to a white color. If a very white color is desired sulphuric acid is added. The stock is then pumped to the drain tanks, consisting of large wooden vats with perforated brick bottoms, through which the bleaching liquor drains.

The pulp is now free from all traces of chemicals used in cooking and bleaching, and is pumped directly to small tubs called "beaters" where it is beaten by a rapidly revolving roll. All ingredients necessary to make a sheet of paper are now added. These consist of (a) white clay, used to fill up the spaces between the fibres in a sheet of paper, giving the sheet a soft, smooth finish necessary for printing; (b) sizing, which is a resinous solution added to make the sheet waterproof so ink will not run; (c) alum, which precipitates the resin in the size onto the fibre; (d) analine or other dyes to give the paper the required color.

The pulp as it comes from the beater is now ready to be made into paper. But is first put through refining engines or "Jordans" and thoroughly triturated, and then pumped to the "stock chests" ready for the paper machines. In these refining engines the beater roll is a conical shaped drum carrying knives, which revolves inside a conical shell completely lined with fixed knives. This process cuts the fibres into the desired lengths, but the effect is to tear rather than cut them.

At the paper machines the pulpy mass flows on to an endless brass wire cloth (60 ft.long and of very fine mesh). A large amount of the water in the pulp passes through this screen, which travels at the rate of 50 to 600 ft. a minute, the speed depending on the quality and weight of the sheet of paper to be made. At the farther end of the moving wire cloth the wet web of paper leaves the wire and is carried forward on soft, endless, woolen felts under heavy rolls, where most of the water is pressed out. The newly formed sheet now passes over revolving iron cylinders, heated with steam, where it is thoroughly dried, then between heavy steel rolls or calendars, where the paper receives a smooth surface.

These paper machines, which really complete the process of paper making, are required to be operated at a variable speed due to the different weights of paper produced on different runs. Accordingly each machine is driven by a 130 h.p. Corliss engine through cone pulleys, and the exhaust steam from the engines heats the drying rolls.

If the paper is wanted in sheets it is run through cutters and cut into lengths and widths as ordered. In the finishing room are supercalenders, trimmers, ruling machines, folding machines and numbering machines, and printing equipment. The finished product is marketed as tablets, wrting pads and a wide variety of stationers' stock.

The average daily output of the mill is 35 tons of paper, about 60 per cent of the finished product going to California and the remaining 40 per cent being consumed in Oregon and Washington.

The main mill of the Everett Pulp and Paper Company operates twenty-four hours a day and six days a week. The chipper, sawmill and supercalender departments work ten hours. No stock is carried, all machines operating on actual orders.

Power Supply.

The plant of the Everett Pulp and Paper Company with the exception of the paper machines above mentioned, is entirely motor driven. There are 77 motors ranging in size from 1 to 200 h.p., and making a total connected load of 2040.5 h.p.

Power to operate these motors was formerly supplied by a 500 kw. steam turbine. In the summer of 1912, due to the continually increasing load on the turbine it became evident that one of three things must be done. Either the 500 kw. turbine must be replaced by a larger machine, a second turbine must be added, or power must be purchased to operate the mill. The engineers of the paper company were at first somewhat skeptical as to the idea of purchasing power. Their power production costs were already very low since their plant was operating under a high load factor; moreover crude oil purchased in large quantities at a very low cost per barrel was used for fuel, and every refinement making for power plant economy was being observed. An extended test would be necessary before the question of purchased power could be definitely decided.

Accordingly, the power company arranged for the necessary service and a temporary power contract was entered into, it being understood that this contract would be made permanent providing the tests showed a saving in cost of operation. In conducting the tests the mill was operated for twenty-two days, on purchased power, and then for twenty-two days on steam turbine power, and during each period the output in tons of paper was practically the same, thus allowing a comparison in cost of power per ton of paper.

At the conclusion of the tests the results were sufficiently satisfactory to the management of the paper company, that they entered into a long term contract for the purchase of electric energy to operate the mill.

At the present time the power demand of the mill amounts to 900 to 1000 kw. and the load factor from 75 to 80 per cent.

ELECTRIC POWER FOR IRRIGATION PUMPING

DEPARTMENT CONDUCTED BY S. T. HARDING

RAINFALL AND AGRICULTURAL POWER USE

BY S. B. SHAW.*

In connection with an investigation into the characteristics of the agricultural load from the central station point of view, recently conducted covering that part of the territory known as the Santa Clara Valley of California, some interesting features were discovered.

Briefly, there are some 14,000 horsepower in electric motors used for pumping water for the irrigation of various agricultural and horticultural lands in this vicinity. The plants vary in size from 5 to 100 h.p. and the water plane is about 50 ft. below the surface, pumping being principally from wells.

The amount of power used per h.p., or the annual load factor of the average plant, was found to vary to a considerable extent from year to year, and depending principally upon the amount of rainfall. Of course other influences were partly responsible for these variations, such for instance as temperature and atmospheric conditions, and also the amount of the crop in view for the approaching season.

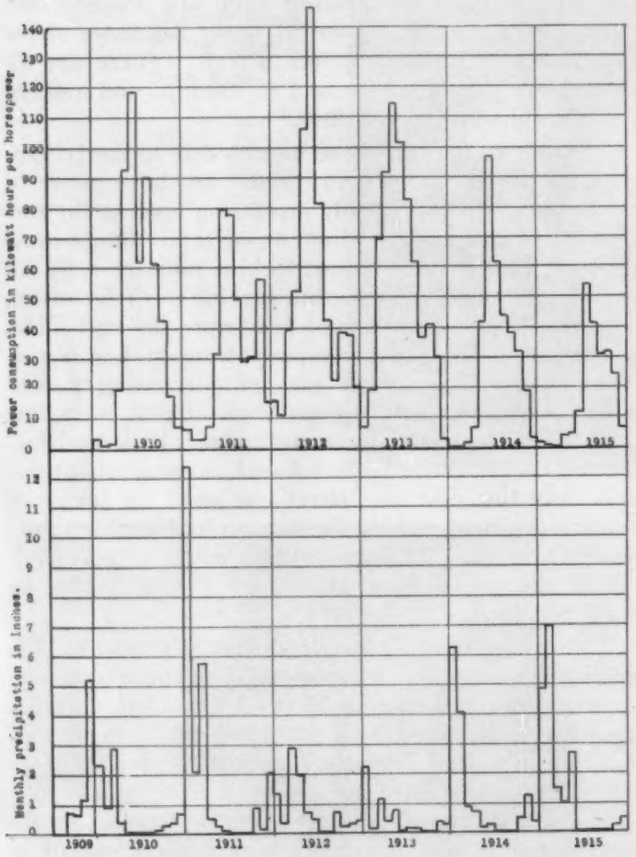


Fig. 1. Monthly Power Consumption and Rainfall.

To ascertain, if possible, the effect of the amount of rainfall and of its distribution throughout the season upon the consumption of electric energy by the irrigation plants, an investigation was made of the annual consumption per h.p. of a large number of plants, and covering a period of several years. From the records of the U. S. Weather Bureau, the precipitation in this territory was obtained. The data as mentioned above are shown graphically in Fig. 1. It will be seen that the data on consumption are based on the number of kilowatt-hours used per horsepower of capacity per annum. Assuming a motor efficiency of 85 per cent, on the above basis, a load factor of 100 per cent per annum would mean a use per h.p. equal to about 7700 kw.-hr. per year.

The amount of rain falling in a certain season influences the agricultural load in the succeeding months; thus when there is a season of heavy rainfall it is followed by a season of proportionally light irrigation, and therefore of poor load factor on pumping plants, and vice versa.

The time at which the rainfall occurs is also of importance. Thus early fall rains during the months of September, October and November will cause a rapid decrease in the pumping load at that time, while the late spring rains in March, April and May will similarly delay the rise of the spring peak, both of which result in a decreased load factor and decreased total consumption.

A concentration of the precipitation during the months of December, January and February results in less penetration and replenishment of ground water and a greater run-off. This will result in an increase in the total annual consumption and load factor. Such a condition is to be noted as occurring in 1911, in which year, although the total seasonal rainfall exceeded that of 1914, the load factor was higher in the former year, probably owing to unusually heavy rainfall of 12.38 inches occurring in January, which was not very effective for the agriculturalist.

After trying various methods of representing the relation between the rainfall and the load factor, the most logical seemed to be that shown by Fig. 2, being the relation between the kw.-hr. consumed per h.p. per annum and the precipitation in inches during the rainy season from July 1st to July 1st, to which is added

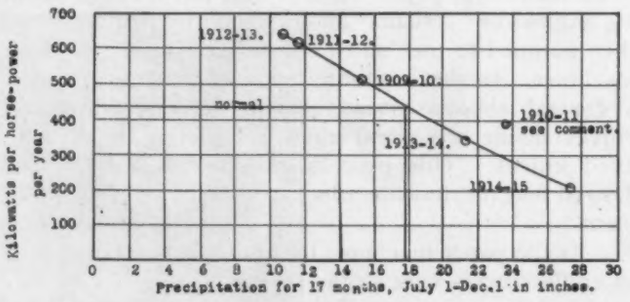


Fig. 2. Relation of Use of Power to Precipitation for Seventeen Month Period.

the rainfall for the succeeding five months to December 1st. Thus in 1914 the energy consumption averaged 342.4 kw.-hr. per h.p. installed. The rainfall during the preceding season from July 1, 1913, to July 1, 1914, was 19.42 inches, while in the succeeding five months, to December 1, 1914, the precipitation amounted 1.86 inches—aggregating for the seventeen months' period a precipitation of 21.28 inches. In this

*Valuation Department Pacific Gas & Electric Company.

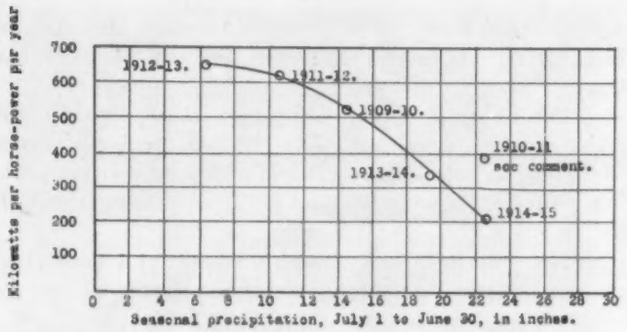


Fig. 3. Relation of Use of Power to Precipitation for One Year.

manner compensation is made for decrease in load factor due to fall rains. Fig. 3 is a curve similar to Fig. 2, except that the rainfall for such twelve months' period has been plotted against the consumption for the corresponding twelve months' period. This, as may be seen, results in a fairly regular curve, with the exception of the variation occurring in 1911, as above noted. Fig. 4 shows the growth of the agricultural power load in these years.

Using the above curves and conclusions derived from them, an attempt was made to estimate what might be termed normal use of energy. In other words, to determine the amount of energy used per horsepower that might be reasonably expected as an average per year over a long period of years.

The following method was used in this procedure:

Considering a year of normal rainfall, as determined from the reports of the United States Weather Bureau—the precipitation for the seventeen months' period is 17.82 inches. Applying this to the above curve of rainfall and consumption, we find that the normal average consumption for San Jose, the county territory, is about 435 kw.-hr. per h.p. per annum.

The following is a tabulation of the above data:

TABLE I.
Relation of Precipitation to Consumption.
Santa Clara County (San Jose.)

Season—	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15,	Normal. 41 yr. Period.
Precipitation (in.)							
Seasonal	14.50	22.65	10.58	6.35	19.42	22.71	15.23
July 1, Dec. 1....	.57	.98	1.21	4.29	1.86	4.62	2.59
Total 17 months..	15.07	23.63	11.79	10.64	21.28	27.33	17.82
Annual energy Cons. kw.-hrs. per h.p.....	514.00	386.00	615.00	648.00	342.00	209.00	435.00

This, then may be stated as the probable average use per h.p. of connected load for this territory, so long as it maintains its present load characteristics. Of course, new methods of irrigation or radical changes in use of land might entirely alter conditions and render the above conclusions valueless.

It is certain, however, that results derived in the above manner, or some such similar way, are more to be credited as being representative of average conditions than an average based on two or three years' figures, as has been sometimes used.

It might be interesting to here note the variation of this character of load during the several months of the year. The monthly distribution of load is well shown in the following table, based on six years' data for this territory. The percent of the total annual consumption per h.p. occurring each month is shown, together with the average for the six years' period.

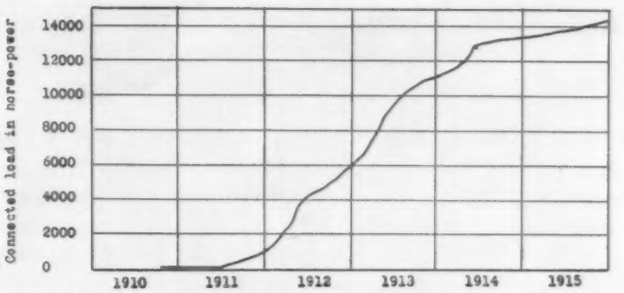


Fig. 4. Growth of Agricultural Load in Santa Clara Valley.

These values probably represent a fairly good average, although the annual rainfall and consumption is a little above "normal" for these six years.

TABLE II.
Monthly Distribution of Agricultural Power Load—Santa Clara Valley.

	——Kilowatt Hours per h.p. per Month.——							Per cent per
	1910.	1911.	1912.	1913.	1914.	1915.	Total.	Month.
January ..	3.06	5.90	15.60	6.6	.7	.6	32.46	1.20
February .	.90	3.60	10.70	19.2	.7	.4	35.50	1.31
March	1.42	3.54	39.80	69.3	1.6	.5	116.16	4.28
April	19.60	6.06	56.80	91.2	6.2	3.2	183.06	6.75
May	93.50	30.60	105.80	114.0	41.5	4.3	389.70	14.36
June	118.20	80.00	145.80	101.5	96.7	12.3	554.50	20.40
July	61.50	78.30	81.80	83.0	60.9	54.1	419.60	15.44
August ..	89.40	48.70	42.00	61.3	43.2	41.0	325.60	12.00
September	60.90	27.90	22.30	35.3	37.8	30.5	214.70	7.90
October...	42.60	29.85	37.80	40.1	31.7	31.6	213.65	7.86
November.	16.50	56.35	36.40	33.9	17.4	24.4	174.95	6.45
December.	6.06	15.05	20.00	2.8	4.0	6.5	54.41	2.05
	513.64	385.85	614.80	648.2	342.4	209.4	2714.29	100.00
Average							452.38	

LETTER TO THE EDITOR.

Porous Porcelain.

Sir: Will you kindly publish the following in your next issue as an amendment to the report of my discussion of the Flaherty paper on "High Voltage Insulators," Seattle meeting, that appeared on page 224 ot the September 16, 1916, issue of the Journal?

Porous porcelain is an important cause of insulator failures. For high voltage insulators the porosity must be within one-tenth per cent; how much we do not know as yet. Porcelain rapidly loses its dielectric strength (against puncture) at temperatures above 100 deg. C. It virtually loses its insulating quality and becomes an electrolytic conductor at 450 deg. C. See Trans. Am. Ceramic Soc., Vol. VIII, p. 472. It has a surprisingly high resistivity-temperature coefficient through common temperature ranges. The chairman of our committee, on looking at the curve sheets, remarked that the porcelain shows a "falling off in resistance of 99 per cent for approximately 45 deg. rise, C."

Fused quartz has many dependable qualities as an insulator. It withstands arcs and corona discharges much better than porcelain. Quartz arrow heads, found abundantly in the soil of Lake County, California, have keen edges and sharp corners. The present Indians in that locality cannot make them. They have the tradition that they were not made by man. Being a lost art, therefore, they must have been made a long time ago. There is evidence here of the validity of the claim of the geologist that an earth product must be non-porous, tough and refractory in order to be stable and to withstand the action of the elements.

HARRIS J. RYAN.

Stanford University, Sept. 19, 1916.

ELECTRIFICATION OF THE OREGON PORTLAND CEMENT COMPANY.

BY D. C. FINDLAY.

(Concluded.)

Fig. 5 is a photograph of the switchboard, which is divided into nine panels. Natural black slate was used, and the oil switches were mounted on a framework and operated by bell cranks and lever under the floor, leaving a clear passage behind the switchboard. Single pole unfused knife switches were

Fig. 5. Switchboard.

mounted between the busbars and the oil switch on each panel, so that each department can be cut clear of the board without disturbing any of the remaining circuits. Current transformers on the two outside legs of each circuit are used for the indicating and integrating wattmeters on each panel, which has an inverse time limit overload relay. By means of these instruments a record is obtained each day. The totalling panel has the following instruments, an ammeter with 3000 ampere scale, and an ammeter switch for measuring all three phases, an indicating wattmeter, power factor meter, and voltmeter, also a Bristol recording voltmeter, and two curve drawing wattmeters, one belonging to the power company and the other to the cement company.

The power is purchased on a basis of maximum demand for a 20 minute peak and one meter checks against the other. The power company also has an integrating wattmeter mounted on the back of the board.

The lighting is handled by two 10 kw. 440-110 volt transformers in open delta in the basement connected to 10 single pole knife switches mounted on the lighting panel each switch controlling one department in the mill.

The station is protected by a bank of 4 tank electrolytic aluminum cell lightning arresters, which are

Fig. 6. Cement Tube Mill Motor with Lenix Drive.

mounted inside the station, but with the horn gaps, and transfer switch on the roof of the substation, shown in Fig. 7, these arresters are charged 3 times daily. A private telephone system connects directly with the load dispatcher in Portland.

The entire distribution system is underground. All power and lighting cables pass directly from the switchboard into a cable tunnel which runs in the form of a "T" for 300 ft. The heavy power feeders, varying from 400,000 to 1,000,000 c.m. are carried on insulators, supported by galvanized iron pipe frames built into the concrete walls of the tunnel which is 5 ft. wide by 5 ft. high and is waterproof.

All remaining power and lighting circuits are in conduit carried by the pipe frames the entire system insuring absolute safety against interruption of service. All service taps are taken off in conduit, buried in the concrete directly to the distributing compensator structures in each department.

Each department has all starting compensators assembled together on a structural steel frame from which the various motor circuits radiate in conduit. The accompanying photographs show two of these structures. Westinghouse Type E dustproof compen-

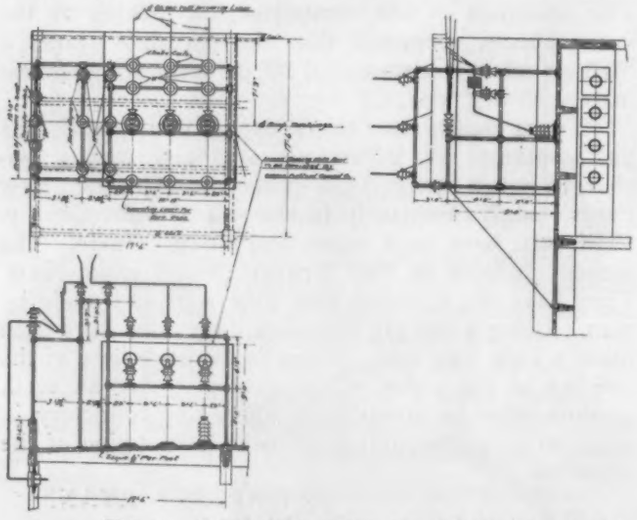


Fig. 7. Roof Construction for Insulators.

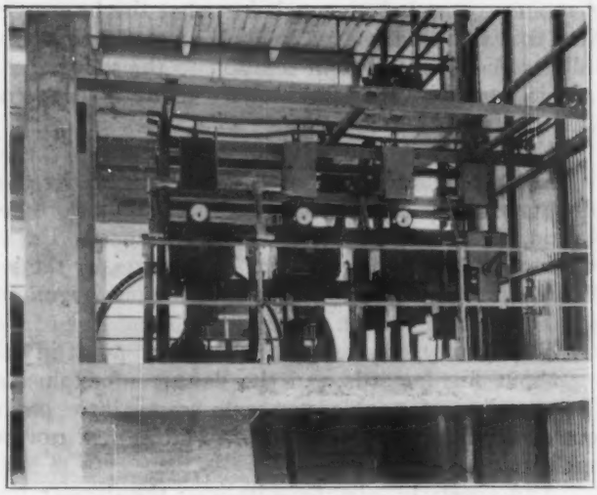


Fig. 8. Electrical Control for Raw Grinding.

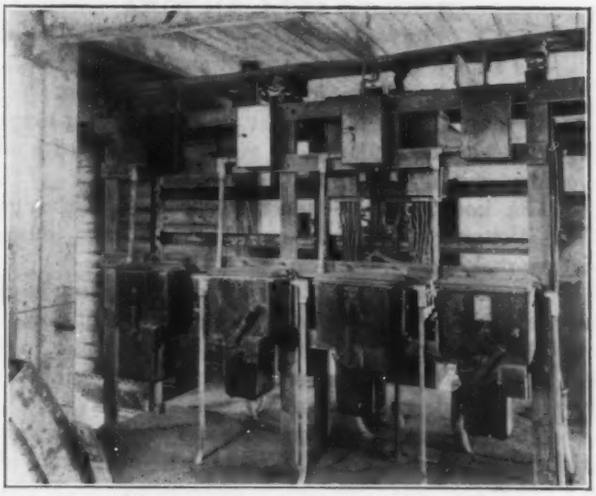


Fig. 9. Centralized Control for Cement Grinding.

sators were used throughout, having conduit entrance and conduit outlet bushings, and each compensator provided with an ammeter for all sizes above 75 h.p., as shown in Figs. 8 and 9.

The main circuit from the cable tunnel forms a busbar running horizontally above the system, from which taps are taken through 3-pole unfused knife switches, in steel cabinets, whose functions are to disconnect each motor for repairs, or when not in service. Each compensator has automatic inverse time limit relays, and also no voltage relays inside the case and protected from any dust. A novel feature of the installation is that every motor has a 600 volt snap switch located directly at the motor, and connected to the low voltage release coil of the compensator by No. 14 duplex cable, so that the operator can open this circuit, and shut down the motor, without taking time to go to the board, in case of emergency. This system of concentrated control allows one operator to stop or start some 700 h.p. in motors without moving more than 10 ft., and in a very short space of time. It also saves greatly in copper. The total power consumption is about 1200 h.p., using 15,000 kw.-hr. daily.

A brief description of the manufacture of Portland cement may be of interest. Two kinds of rock are used, lime rock from Roseburg, Oregon, running about 96 per cent Ca CO_3 and a cement rock from Dallas, Oregon, about 60 per cent.

A 75 h.p. Westinghouse squirrel cage motor drives a 7½ Austin gyratory crusher and the rock is elevated and stored in 10 circular reinforced concrete storage bins 69 ft. high and 22 ft. in diameter with 6 in. walls. These bins hold 12,000 tons. A belt conveyor in a tunnel draws the rock off and it is elevated and discharged into feed bins over the kominuter. In this mill the proportioning of the two rocks is done by two automatic feeders discharging into the kominuter into which a stream of water is also fed. This mill is driven by a 150 h.p. motor with Lenix drive.

The final grinding is done in two cylpeb tube mills using small steel cylpebs and driven by 200 h.p. motors with Lenix drives. These mills take their feed from a reinforced concrete feed trough which was built as a unit with the floor beams, and has an agitating shaft and paddles. The walls are only 4 in. thick but are watertight.

Three circular correcting basins 24 ft. in diameter allow the chemist to vary his feed till he gets 76.6 per cent Ca CO_3 when mixed in the agitating basin below. The Ingersoll Rand air lift pumping system is used for pumping the slurry over to the 2000 barrel reinforced concrete storage basin under the kiln.

A mechanical feeder lifts out a definite amount of slurry each revolution and feeds it into the rotary kiln which is 210 ft. long by 9 ft. and 10 ft. in diameter, being the largest kiln on the Pacific Coast. It rests on five tires and weighs about 500 tons and is driven by a 75 h.p. variable speed motor, under the burners control. Crude oil is used with air at 2 pounds pressure for atomizing and it requires approximately 8.4 gallons of oil per barrel which is lower than the average consumption. The kiln is rated at 1000 barrels but easily produces 1200 barrels per day and requires only two men to operate on each shift.

The clinker is cooled by a Smidth horizontal pressure cooler, using a blast of air from a 12 foot diameter pressure fan. Another novelty in this plant is the method of handling this clinker, using No. 480 drag conveyor chain in a cast iron lined, reinforced concrete trough, and discharging into a reinforced concrete elevator leg from which a belt conveyor takes it to circular storage bins holding 6600 barrels each.

In this condition as soon as the clinker is ground fine enough, it becomes the finished cement. A kominuter and 22 ft. tube mill in the grinding department grinds 1200 barrels per day with two men on each shift of 12 hours each.

The tube mill is driven by a 250 h.p. motor with Lenix and a 24 in. belt and is shown in Fig. 6.

From the storage bins which are of reinforced concrete the cement is drawn off and packed into sacks as required. About 40 men only are required to produce 1200 barrels daily of "Oregon" brand, exclusive of the quarries.

R. P. Butchart, Victoria, B. C., is president of the company, L. C. Newlands is superintendent and D. C. Findlay, chief engineer, who has designed and supervised the entire civil, electrical and mechanical construction.

HOW TO SELL AN IDEA.

By an Electric Range Salesman.

It's almost impossible to sell an electric stove.

It's easy to sell the idea of electric cooking.

So long as you stick to stove selling, you may be sure that electric cooking, as a practical part of housekeeping, will make slow progress.

The kodak people don't sell cameras; they sell "The Witchery of Kodakry," that is, the idea of picture-making.

The automobile people don't sell a gasoline engine on wheels; they sell the idea of luxurious motion.

The phonograph people don't sell a spring motor and an intricate mechanism for reproducing vibration; they sell the idea of ready-made music.

The real estate promoter doesn't sell a quantity of brick, mortar, joists and shingles; he sells the idea of a home.

The manufacturer selling a "Hoosier" kitchen cabinet for $86 is selling the idea of convenience, for one can buy a kitchen table for $3.25—and it will do almost the same work.

And so we fellows in the electric business may as well realize that we cannot sell sheet iron, castings and heating elements made up in the form of electric stoves; we must sell the idea of electric cooking.

The first and outstanding feature of an electric range is the price. A good range, suitable for the hard usage of daily service in a normal household, costs about seventy-five dollars.

Seventy-five dollars! Why you can get a peach of a gas stove for thirty-five and a dandy coal range for even less.

And then, the cost of operation! "It costs two or three times as much to cook with electricity as it does with other fuel"—any competitor will tell you that! And so forth. And so right there most salesmen quit—the salesmen who are trying to sell a thing of iron and heating elements.

But you are selling the idea of cooking by electricity. You will sell the idea in spite of the price of the thing.

Satisfaction First.

The history of civilization is seated in the fact that human beings are not satisfied with cheapness. If men were willing to utilize the cheapest article that would serve a given purpose, we would today be cooking over wood fires; we would be wearing denim pants; we would be walking instead of burning up 26-cent gasoline; we would be eating rice and lentils instead of squab and alligator pears.

Human beings are not satisfied with cheapness—also they are not satisfied with the old, uncomfortable, laborious, time-killing ways of doing things. People want speed, comfort, luxury. They are willing to pay for it. If we wern't, we'd be living in tepees and eating our meat raw.

I hope you will get the point in that idea, for it's the basis of success in selling electric ranges.

It is really difficult for a man who has been selling flat irons at two-ninety-eight to jump in and negotiate a stove sale at seventy-five dollars. It takes a considerable mental readjustment not to think the seventy-five is a lot of money.

Right here I'll surprise you—seventy-five is a lot of money. But it isn't much for what the buyer gets. And that's the only way to look at the seventy-five-dollar price—look at it in relation to the value.

Is it worth seventy-five dollars to be able to cook with electricity?

Yes!

Some manufacturers of electric ranges list these advantages of electric cooking: Safety, Sanitation, Regulation, Economy, Coolness, Progressiveness. I'm not convinced that these are all the arguments, or the best arguments. It will be well to weigh your arguments well before using them.

Take safety, for example; there's no point in talking about fire hazards and the danger of explosions. The number of people you can scare into paying seventy-five dollars for an electric stove will not add much to your sales.

And similarly, about sanitation; the danger from poisonous gases which contaminate the atmosphere or food is often a bit exaggerated; and the salesman who exaggerates, forfeits his customer's confidence. As a matter of cold fact, a good gas stove, properly installed, will not contaminate the atmosphere as much as a cat sleeping on the hearth.

So let us forget the knocks against competitors and examine our own advantages.

Absence of Heat.

The woman's first objection to cooking is the heat of the kitchen. Down east, in the country, every house has what is called a summer kitchen—a lean-to located between the woodshed and the regular kitchen—where the summer canning is done. The reason is that such operations, if carried on in the regular kitchen, would super-heat the entire house. Many suburban homes have both gas and coal stoves, or combination gas-coal stoves, for the same reason.

The electric range is the coolest cooking appliance. Its coolness is inherent. The cooler it is the more efficient, for every heat unit that escapes represents loss. This argument can be played to any extreme without fear of contradiction, and especially where the housewife does her own cooking.

Most women like to feel that they can be dainty about their work. To tell a woman that she can come in from the matinee or club meeting, slip on a coverall apron, and cook a complete dinner without even becoming flushed is to arouse the first spark of desire for electric cooking.

An examination of the stove you sell will give you definite talking points along this line. The automatic feature which several stoves have; the so-called fireless cooker units; the well insulated oven, which in some cases does not have to be opened to permit the food to be watched; the surface units with their complete concentration of heat—all these emphasize the big point that electric cooking is cool.

Ease of Regulation.

The next bugaboo in cooking—as ordinarily practiced—is its uncertainty. Very many women complain that they have "bad luck" in cooking. There's a reason for this with other types of stoves, and that reason is the difficulty of regulation. The electric range has perfect regulation.

Do not make the mistake of saying that other

ranges can't be regulated, for they can. Instinct, practice and (I am convinced) the assistance of Divine Providence, will enable a skillful cook to keep even a wood stove at exactly the desired heat; the point is that the regulation of any but an electric range is uncertain.

Thus, when a woman discovers what amount of heat is required for a given operation, she can duplicate that temperature day after day invariably. If she is baking, for example, she knows after one or two experiments just how many minutes to leave on the high heat and how many minutes to leave on the low heat. If she times herself she always gets the same results. Room temperature, gas pressure, quality of anthracite, condition of the flues, flare-backs at the burner, direction of wind, humidity or luck have nothing to do with it.

Right here we may run into trouble.

"Goodness!" exclaims Mrs. Blank, "I don't know how long it takes to bake three pies. I'm sure I could never learn to run a stove like that."

This is your chance for tact.

"Madame," you say, "cooking on an electric stove may perhaps require more intelligence, but it does not require the years of practice which other methods demand. Now with your intelligence——"

And you start all over again, showing her the simplicity of the controls, the incomplex temperature gauges, the almost automatic character of the whole operation.

Then get back to this argument about certainty. Show that the danger of burnt food, of an underdone roast, of a "fallen" cake, of watery custard, of dried out meats, of parboiled potatoes—in fact all the culinary tragedies which are supposed to lead ultimately to the divorce courts—are simply impossible with an electric stove.

Here's another point: If hubby fails to show up for his meals on time, or if the dinner guests are late, the delay means ruin to food cooked upon other stoves. With an electric, the instant and perfect regulation enables the houeswife to hold the cooking in process for a considerable time, and still bring it to the table in excellent condition. I sold a stove on this argument myself.

Economy.

When somebody tries to argue on the cash economy of electric cooking I have to laugh. The lower cost of electric cooking—it reminds me of the kid's essay on the subject of snakes at the North Pole: "There ain't any snakes at the North Pole." What does this word economy mean, anyway? My definition is: accomplishing something at the least cost per unit of result. And when I say cost, I don't mean money spent; I mean cost as measured in cash plus effort, plus time.

If you count the cash only, cooking electrically is expensive—except under very favorable conditions—low rates, etc. You may as well face that fact squarely. But if you count all the factors of cost—cash, time, effort and result—then electrical cooking is at least as economical as any other kind of cooking. It's the same with electric light, which is as cheap or cheaper, than candles, coal oil or gas if you take everything into consideration.

Electric cooking is economical of time. The woman who cooks on an electric range saves at least ten hours every month. Ten hours of any woman's time ought to be worth a dollar, and no woman who is able to pay for an electric range will deny it.

Electric cooking is economical of food. There is on the average ten per cent less shrinkage of foods cooked electrically than where the cooking is done by a process which hastens evaporation. Reduced to terms of the butcher and grocer's bills, this should mean at least one dollar per person per month—or say four dollars a month for a family of five.

These two items of saving amount to five dollars a month, which is more than enough to equalize the difference in the bare cost of gas as against the bare cost of electric current.

We fellows in the electric business make a mighty mistake in permitting all comparative cost arguments to centre upon the monthly bill. As well measure the food values of a meal by figuring the cubic contents of the provender, or the earning capacity of a man by his weight. The monthly bill for electricity used in cooking will be greater in many cases than the monthly bill for gas or coal or wood, but the actual cost of electric cooking is no more—probably less—than any other method.

Food Saving.

While it is possible in some instances to prove that the electric bills for cooking will be less than the bills for other fuel, this is an argument which it is seldom wise or necessary to use.

You, as a salesman—the salesman whose business it is to get the housewife's order on the dotted line, do not need any such argument. You can sell the electric cooking idea—and the stove to make that idea a reality—even when you admit to your customer that the monthly service bills are double. You can do it by insisting upon the real economies of electric cooking—the saving in food shrinkage, the time saving, the labor saving.

However, don't forget that you must translate these economies into terms of money. To tell a woman that electric cooking saves time is futile; tell her how much time, and then put a cash value on that time. To talk about the saving in food shrinkage won't convince her; tell her the amount of the shrinkage, and then put a cash value on it by checking over her last month's meat bills.

There are a lot of other economy arguments that can be developed aud used. In stoves having the fireless cooker units, the thoughtful woman can use occasional cheap cuts of meat and effect maybe a couple of dollars a month extra saving. Consult your wife and butcher and find out what cuts can thus be utilized and how much the actual saving is.

Again, the automatically controlled stoves permit considerably more time saving. Consult the manufacturers and check their claims against the judgment of two or three practical housewives.

There are various ways of doubling up the items in a menu so as to cook two or more articles together, thus effecting economy of current. Before you use that argument, get a good selection of modern menus; the old-time fireless cooker salesman pretty nearly wore out the pot-roast-and-dumpling combination.

There are times when the argument about saving the cost of repainting the kitchen may be used effectively—but not often. Use plenty of tact with this argument and first be sure that the old way of cooking has caused smoke and grime. Not only do women resent the suggestion that their kitchen is dirty but there are few who would buy an electric range to save the slight cost of repainting the kitchen.

And Finally Remember This—

Don't be bluffed by price. The first cost of an electric range is not high, because you can actually prove the value.

Don't try to manufacture exaggerated arguments in favor of electric cooking. You've got too many good arguments.

Don't talk comparative costs of other fuels against electricity. Talk of the undoubted and easily proved economy of cooking by electricity.

Don't try to sell an electric stove. Sell the idea of electric cooking.—Extracts from booklet from Society for Electrical Development.

SPECIFICATION NOTES FOR DRAIN TILE.

The "Durability of Concrete Drain Tile" is the title of special bulletin No. 75 recently issued by the Michigan Agricultural College, by O. B. Winter and H. H. Musselman. The conclusions reached from their investigations are as follows. Whenever the disintegration of tile has been noted in their experiments it was found to be due to one or more of the following causes:

(1) The use of too lean a mixture.

(2) The use of too dry a mixture.

(3) Improper hardening of the product after it is formed.

(4) Placing the tile in the ground before the concrete has sufficiently hardened to afford proper resistance to the solvent action of soil water upon the cement.

The six most important factors in manufacturing concrete tile of good quality are:

(1) A Portland cement, meeting the requirements of the standard specifications for Portland cement of the American Society for Testing Materials, as revised to date.

(2) Clean and preferably siliceous sand, graded in size from the finer particles to those which will just pass a ¼ in. mesh screen, for all tile ten inches and less in diameter.

(3) Proper and accurate proportioning of the cement and sand. The method of measuring materials should be one which will insure separate and uniform materials at all times.

(4) Thorough mixing of materials, preferably by a power-operated batch mixer, and continuing for at least one minute after all materials, including water, are in the mixer.

(5) Using a machine that accomplishes thorough packing of materials at proper consistency.

(6) All other conditions of manufacture having been as outlined, hardening in a properly equipped and operated steam room will produce tile of the highest grade. When, however, hardening by water vapor is not possible, tile must be kept constantly wet on the surface by sprinkling with water for not less than seven days under favorable weather conditions, and longer during cold weather.

It is stated that the practice which has been recognized as best, specifies that not more than 20 per cent of the sand shall pass a sieve having 50 meshes per linear inch and not more than 6 per cent shall pass a sieve having 100 meshes to the linear inch. A mixture of at least 1 sack of cement to 3 cubic feet of sand is recommended.

REPORT OF GLENDALE LIGHTING PLANT.

H. B. Lynch, manager public service department, city of Glendale, California, reports a profit of $10,793.10 in the operation of the city's lighting system for the year ended June 30, 1916. The city purchases power from a private corporation and distributes it for local use. The electric light system consists of over 50 miles of pole line and an underground conduit system about one mile long through the business portion consisting mostly of nine ducts of fibre conduit. The department also owns a brick substation and warehouse and its office.

The street lighting system consists of 265 five-light ornamental standards, 107 single-light ornamental standards, 211 single-light posts, covering a distance of 17 miles, all lighted from underground cables, and 338 gooseneck lamps supplied from overhead wires.

There are now about 3100 electric meters connected to the lines of which 2780 are in the City. As there are approximately 8200 people in Glendale the system has 34 meters connected for every 100 of population. Practically every house within the limits is connected to the lines.

During the year the department purchased 1,459,318 kw.-hr. of electricity, an increase of 17 per cent in the amount used on the system.

The department operates the water as well as the lighting system, handling from the same office. All accounts are kept in accordance with the classification of the State Railroad Commission.

Rates for light are 7 cents per kw.-hr. for the first 20 kw.-hr. used per month; 5 cents for the next 14 and 3 cents thereafter, with 50 cents monthly minimum.

An examination of the detailed financial statement shows as to the electric light system:

The total electric operating revenue for twelve months was		$ 57,590.72
From which should be deducted the following expenses:		
Total operating expenses for 12 months	$ 12,898.89	
Bond and other interest	4,503.41	
Depreciation of plant and equipment	9,395.32	
Total expenses for 12 months		$ 46,797.62
Leaving a profit for the 12 months, after deducting operating expenses, interest and depreciation of		$ 10,793.10
The amount invested in the electric light system is	$130,101.66	
With current assets of	16,848.07	
Making the total investment		$146,949.73
Against this is a bonded debt of	$ 87,000.00	
And current liabilities of	5,571.34	
Making a total debt of		$ 92,571.34
Leaving the surplus of the electric system from its acquisition to June 30, 1916		$ 54,378.39
Additions and betterments to the system for the 12 months amount to		$ 7,620.72
Bonded indebtedness for the 12 months		$ 3,500.00

SPARKS—CURRENT FACTS, FIGURES AND FANCY

The quantity of cement produced in the United States for 1915 is given by the United States Geological Survey as 85,914,907 bbl., with a value of $73,886,820.

* * *

Reports of the U. S. Geological Survey show that in 1915 California produced in mineral wealth a total of thirty-two million dollars as compared with twenty-five and one-half millions in 1914.

* * *

The considerable demand for antimony during the last year has stimulated the development of certain Alaskan deposits of ore of that metal, from which ore to the value of about $74,000 was mined and shipped during 1915.

* * *

During the first half year of 1916, the gross earnings of central stations in America reached the enormous total of over two hundred million dollars, an increase of fifteen and six-tenths per cent over the best previous similar period.

* * *

One $1000 shipment already made to India and orders on hand amounting to over $3000 are among the new business obtained by a Chicago shoe company from its use of "Trade Opportunities" appearing in recent issues of the Commerce Reports.

* * *

One great blessing has resulted from the scarcity of raw materials due to war times. Like the scarcity of money, scarcity of raw materials leads to economy. It spurs to efficiencies hitherto thought impossible. The working out of this fundamental truth is to be observed on all sides.

* * *

The fact that the tungsten-bearing mineral—scheelite—is associated with garnet is a great help to the prospector, and all bodies of garnet rock scattered through the great granite masses of the eastern Sierra slope bordering Owens Valley are being carefully examined and panned for scheelite.

* * *

Eight men of the forty-eight hundred employed by the Pacific Gas & Electric Company, have recently been placed on the roll of honor. This high distinction commemorates forty years of active service with the company. The men are John A. Britton, R. J. Courtier, Jas. Cunningham, Jas. Kingston, George Kirk, J. Nolan, E. E. Roeing and Dan Toland.

* * *

An innocent bystander has inquired whether convicts employed in highway construction thus become highwaymen. As no serious complaint has arisen concerning past expenditures of eighteen million for such purposes in California a negative answer seems to be justified. There is every present indication that the voters of the state will approve an appropriation for fifteen million more at the November election.

* * *

The records of the customs on the Pacific Highway at the boundary between British Columbia and Washington show that during the period from June 1 to August 15, 1916, 3768 automobiles, carrying 14,700 passengers, crossed the boundary at this point. Seventy-five per cent of these machines were American owned.

* * *

The New Zealand Government has erected during the past nine years 548 homes for workingmen. The law provides that the homes should cost no more than £300 ($1460) each, and these are to be placed at the disposal of the workers under a lease of 50 years, with a fixed rental of 5 per cent of the capital value of the dwelling, plus insurance and taxes.

* * *

The London Omnibus Company has adopted the words "Is It Safe?" as a slogan instead of "Safety First," for the reason that if the question be mentally asked of oneself in a perilous moment, it instantly directs attention to the dangers present wherein the instinct of self-preservation will assert itself, and this is in most cases all that is necessary to induce watchfulness and care.

* * *

A million tons of nitrogen could have been obtained, by proper treatment, from the bituminous coal mined in the United States last year. At an estimated requirement of 40,000 tons of nitrogen in the form of 180,000 tons of nitric acid this would be enough for a twenty years' war. Methods of recovering coal nitrogen as ammonia and then converting it into nitric acid have been sadly neglected in this country.

* * *

Electrolytic zinc plants offer a desirable market for hydroelectric power. This week work was started on such a plant by the Mammoth Copper Company at Redding, California. At Anaconda, Mont., a similar plant has been in successful operation for some time. Amalgamated Zinc (Ltd.) of Melbourne, Australia, has contracted for 4000 h.p. from the Tasmania hydroelectric department at a $17 per h.p. yr. with an option for 26,000 h.p. at $9.73.

* * *

Molasses as fuel for industrial purposes is being produced in Hawaii and is to be shipped to the Pacific Coast to compete with California fuel oil. Until recently 70 per cent to 80 per cent of the exhausted molasses from the Hawaiian factories was thrown away as useless. Furnaces are now being installed which burn this molasses, the heat going to furnish steam for the factory, and the ash from the molasses, which contains 33.32 per cent potash and 4.60 per cent phosphoric acid, is used as fertilizer.

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Absence of Engineers at Conventions

Recently there has been apparent a regrettable tendency on the part of many power companies not to encourage their engineers to attend the conventions of the technical societies. On the other hand, the commercial men are much in evidence. Such an observation is merely added evidence that this is the day of the commercial man, that the problems of selling electric current are more pressing than those of generating and transmitting it. Yet the transient importance of one should not be allowed to eclipse the permanent necessity for the other. Engineering knowledge and business ability are co-ordinate factors in the success of any technical utility. Without the engineers the salesmen would have nothing to sell.

The first reason usually assigned for the non-attendance of engineers at conventions is that engineering design, construction and operation has become so standardized that the need for an interchange of experience no longer exists. The fallacy of this argument was shown at the Seattle meeting of the American Institute of Electrical Engineers where insulator troubles and inductive interference problems were ever provocative of discussion. And when these difficulties are overcome new questions will arise, equally puzzling and likewise demanding a blending of experiences and experiments to bring about their solution. The science of electrical engineering is advancing more rapidly than any other today, and a casual standardization of fundamentals in design and construction is not the limit of development.

Another cause suggested for the absence of the engineer is that the fault resides entirely with himself. This is true in large measure. The average engineer fails to impress the management with the benefits to be derived from participation in these meetings. He is content to let others take the initiative. This inertia should be overcome and effort made to rub shoulders with others in the profession.

Furthermore, the engineer has disdained the "little" problems which most concern a central station management. He likes to deal with big generating plants and long transmission lines, neglecting the details of current utilization. As a consequence these smaller details have frequently been left to less competent men and progress has been retarded. The engineer's work would be appreciated to a far greater extent if he would aid in the solution of these minor matters.

To be specific,—all the difficulties of electric cooking and water heating have not yet been overcome. What diversity factor is to be expected from this class of consumers? What transformer and line capacity is necessary to give satisfactory service? What form of rates is best adapted to these needs? Let the engineer get down on his hands and knees to study these problems. Then he need have no complaint about lack of appreciation.

Many engineers are already awake to these facts. As others realize them the managers of the power companies will be anxious for their technical staffs to attend meetings where they may learn what others are doing to solve similar difficulties.

A technical convention is not a mere gabfest. Its true function is to instill in the minds of those who attend it a higher conception of the interests which it represents and to point out the way in which this higher conception may be translated into terms of everyday value and efficiency. So, when the next Pacific Coast convention of Electrical Engineers is held at Los Angeles in 1917 may there be a representative attendance of the men who are making possible the electrical service which the commercial men sell.

Why Insulators Fail

Insulator failures, once sporadic, then endemic to the Pacific Coast, and recently epidemic throughout the country, have long baffled experts. A great mass of testimony has been taken, much of it contradictory, but an entirely satisfactory diagnosis has not yet been made. A few advanced thinkers can tell why insulators fail but no one has conclusively told to stop them from failing. In this respect it is like the old question as to why girls leave home.

Perhaps the most reasonable explanation so far is that propounded as the first result of a series of tests which have been conducted at Stanford University under the direction of Professor Harris J. Ryan. These tests have been financed by a number of Pacific Coast power companies. No formal announcement has yet been made regarding the results, but from reliable sources it is learned that the porosity of porcelain is the immediate cause of its failure as an insulator. Insulators absorbing more than 0.1 per cent of their weight in water have been found defective, the pores affording a path of low resistance which is finally broken down by the repeated bombardment of high frequency currents. Experiments by W. D. Peaslee at the Oregon Agricultural College indicate that mechanical as well as electrical failures are due to this cause.

As a consequence Professor Ryan suggests that some other material may yet displace porcelain just as porcelain superseded glass. Fused quartz is proposed as such a substitute and experiments are now under way to determine its suitability. Should these prove successful a new application for electric power may thus be opened up, as the intense heat of the electric furnace is essential to melting the quartz.

Yet, in the face of these disparaging reports concerning porcelain insulators many high tension systems are maintaining satisfactory service with them. Analysis seems to show that in these systems high frequency surges have been minimized. Lightning arresters have been placed at the exact terminals of impedances and every precaution has been taken to filter out harmful transients.

So, fundamentally, those transients are the cause of insulator failures. Their elimination reduces insulator troubles to a minimum. This fact gives further incentive to the power companies to do away with those disturbances which the telephone companies complain of as being the causes of inductive interference. High frequency transients are as inimical to successful transmission of high voltages as to successful telephony.

Consequently, conservative engineers are not yet ready to conclusively condemn porcelain insulators. Much of the mystery as to the cause of their failures has already been cleared and final reports should be awaited before taking any drastic action.

Electricity in the Paper Industry

The prevalent high cost of paper has resulted in a commendatory effort to conserve the supply and prevent useless waste. Furthermore it brings to the foreground the possibility of increasing the production, especially in regions where wood pulp and hydroelectric power are available. For this reason a peculiar interest should be found in the description of the Everett paper plant published elsewhere in this issue.

A paper mill affords a most desirable form of load for a hydroelectric power company, not only on account of the power required for the production of the paper but also because the chemicals employed can be economically produced electrochemically.

Caustic soda and chlorine bleach are essential to the manufacture of paper from wood-pulp. These chemicals are produced by the electrolysis of sodium chloride and already from the basis of the most successful electrochemical industries yet established on the Pacific Coast. The possibilities of the further development of a paper manufacturing industry consequently afford a fruitful field for investigation.

Standardizing Voltages

The latest beneficiary from the standardization wave which is engulfing inefficiency and waste is the seller of incandescent lamps. It is now proposed to standardize central station commercial voltages, to do away with the fifty-seven different varieties of voltages, and select 110, 115 and 120 as standard.

Not only will this benefit the seller of lamps by simplifying his stock requirements and records, but it will also reduce the cost of manufacture. With the refined methods of manufacture now in use it is possible to correctly predetermine the voltage of a finished lamp. By concentrating on a limited number of voltages costs can be cut and prices ultimately can be reduced.

The great objection to such standardization comes from central stations distributing current over wide areas. No matter what the generating voltage may be, the line drop causes voltage variation at different points of consumption. Numerous substations are necessary to insure uniformity in voltage. Many progressive companies regularly make voltage surveys and inform consumers of the exact voltage at their premises. This practice is a great aid in obtaining the best lighting results and should be encouraged. Eventually, however, it seems likely that distribution lines will be shortened so that voltage standardization will be a reality.

PERSONALS

C. C. Hillis, manager Electric Appliance Company, is making a trip East via Oregon and Washington.

Rudolph W. Van Norden, consulting electrical engineer at San Francisco, spent the past week at Visalia, Cal.

Milton Henoch, electric range specialist, Westinghouse Electric & Manufacturing Company, is at San Francisco.

T. W. Simpson, Pacific Coast manager Federal Sign System (Electric) spent the past week in Southern California.

W. G. B. Euler, superintendent of operation Great Western Power Company, was married at San Francisco last week.

C. T. Phillips, consulting engineer at San Francisco, has been elected a member of the Illuminating Engineering Society.

A. E. Morphy, assistant secretary Southern California Edison Company has returned to Los Angeles, from San Francisco.

D. S. Brown, assistant to the sales manager Westinghouse Electric & Mfg. Company, is at San Francisco from Pittsburg.

A. J. Jones, salesman with San Francisco office General Electric Company, is making an auto trip through Northern California.

Joe Beane, superintendent of the Nevada Valley Power Company, was at San Francisco from Lovelocks during the past week.

Garnett Young, manager Telephone-Electric Equipment Company, has returned to San Francisco, from an extended Eastern trip.

F. D. Fagan, manager Edison Lamp Works of General Electric Company, at San Francisco, is visiting the Eastern lamp factories.

H. E. Bittman, secretary Telephone Electric Equipment Company at San Francisco, is spending his vacation in the Feather River Canyon.

H. S. Batchelder, commercial agent Western States Gas & Electric Company, Stockton, Cal., was at San Francisco during the past week.

Elgin Stoddard, manager Chas. C. Moore & Company, has returned to San Francisco from a month's trip through Nevada, Utah, Idaho, Washington and Oregon.

George K. Weeks has resigned the presidency of the San Francisco-Oakland Terminal Railways, to become active head of the National City Company of California.

M. F. Steel, sales representative Benjamin Electric Manufacturing Company, attended the meeting of the Pacific Coast Electrical Supply Jobbers' Association at Hayden Lake, Idaho, this week.

Guy L. Bayley, consulting engineer at San Francisco, is in the Yosemite Valley making arrangements for the construction of a hydroelectric power plant for the U. S. Government.

Frank Somers, president California Association of Electrical Contractors & Dealers, is at Seattle attending the convention of the Washington Association of Electrical Contractors & Dealers.

S. M. Kennedy, general agent Southern California Edison Company, has returned to Los Angeles after completing an intimate study of commercial conditions in Washington, Oregon and Northern California.

Romaine W. Myers, consulting engineer at Oakland, Cal., is making an extended trip throughout the East, during the course of which he will attend the convention of the Illuminating Engineering Society and their course of lectures.

H. W. Alexander, director of publicity Society for Electrical Development, will be at Salt Lake City, Utah, September 24-27, in the course of an extended trip he is taking to stimulate interest in "America's Electrical Week," December 2-9, 1916.

C. H. Huyck, salesman with the Western Electric Co., addressed a recent meeting of the Alameda County Electrical Development League on the subject of Marketing Electric Ranges. **W. R. Lyall** of the D. & W. Fuse Company also spoke on the manufacture of fuses.

Max Loewenthal, until recently electrical expert for the Dohrmann Commercial Company, addressed the members of the Los Angeles local of the Electrical Dealers' and Contractors' Association on "The Electrical Dealer's Problems" at their regular session last Friday.

H. H. Hoxie of the Electric Railway & Manufacturers Supply Company of San Francisco, is attending the meetings of the Washington Electrical Contractors' and Dealers' Association at Seattle and the Electrical Supply Jobbers at Hayden Lake, Idaho. He is expected back September 27th.

Ralph W. Pope, honorary secretary American Institute of Electrical Engineers, has been visiting the several Pacific Coast sections of the American Institute of Engineers since the close of the Seattle meeting. He was the guest of honor at luncheon at Portland, San Francisco and Los Angeles, and is now at Salt Lake City, where there is a strong probability that a section of the Institute will be formed during the next few months.

MEETING NOTICES.

California Association of Electrical Contractors and Dealers.

The quarterly meeting of the association will be held at Stockton, September 30, 1916.

San Francisco Section A. I. E. E.

The 1916-1917 season of activities of the San Francisco section will be opened Friday, September 22nd, at 8 P. M., in the rooms of the Engineers' Club, No. 57 Post street. The subject of the meeting will be "The Application of Electricity to Gasoline Driven Automobiles." H. S. Clarrager will present the subject of "The Entz Transmission," and H. A. Hussey will discuss "Electric Starting, Lighting and Ignition as Applied to the Automobile."

Washington Association of Electrical Coutractors and Dealers.

The first annual convention of the association was held at Seattle, Setpember 19-20. The opening address was given by President V. S. McKenney, who welcomed those present. J. J. Agutter spoke of the history, aims and purposes of the association. C. C. Hillis gave an address on "Co-operation and Education"; P. J. Aaron on Acceptances"; W. O. Fouch on the "Oregon Association, and Results Obtained"; C. A. Young on "The Tacoma Ordinance and State Legislation." W. S. Berry gave the jobbers' idea as to what the California Association has accomplished and F. J. Somers talked from the contractors' standpoint. Hugh J. Tinling of Spokane gave his impressions of the California Association's convention. At the banquet Albert H. Elliot spoke on "Co-operation." On Wednesday an automobile trip was taken to the summit of the Cascade Mountains.

Oregon Association of Electrical Contractors and Dealers.

The association met at the Electrical building on Wednesday, August 30th. A code of ethics was adopted similar to that of the National Contractors' Association. The matter of approving and adopting the rules submitted for governing the Western Conference Board were adopted as submitted and it was further moved and carried that this association adopt and ratify such a board, and that the matter of selecting a delegate for said board be done by electing a member at an election to be held in the near future the date of same to be set by the executive committee. J. W. Oberender and J. H. Sroufe were appointed delegates to attend the Washington Association's annual convention to be held at Seattle, September 19-20. A. S. Moody, the newly appointed vice-

president and manager of the Pacific States Electric Company's Portland branch, addressed the meeting at some length. It was announced that another already built house wiring campaign was going to be held and that a committee was now working out the details.

Electrical Development & Jovian League of San Francisco.

The regular weekly meeting was held September 13th, President E. M. Cutting presiding. This being the business meeting of the month the treasurer's report was presented and accepted after which a nominating committee consistinf of Messrs. D. E. Harris, H. E. Pitts, E. A. Wilcox, F. E. Boyd and H. C. Reid, was appointed to select nominees for the various offices of the league to be presented for balloting at the October business meeting. This concluding the routine business the meeting was turned over to J. C. Manchester who acted as chairman of the day and introduced Mr. Andrea Sbarboro, banker and president of the Italian-Swiss Colony of California, as speaker of the day. Mr. Sbarboro took for his subject, "Prohibition," and detailed why the pending state prohibition amendments should be voted against at the coming election. The speaker compared conditions in the European countries where the light wines and beers were as common a household article as tea or coffee in this country and presented evidence showing the almost total absence of intoxication in those countries. He believed in the strict regulation of the saloon and a distinction between liquors carrying a high percentage of alcohol and beverages with a very low or practically no percentage of alcohol.

TRADE NOTES.

The Edison Storage Battery Supply Company announces the opening of its Los Angeles office on the fourth floor of the San Fernando Building, corner Fourth and Main streets. Mr. James F. Rogan, who has been acting as local distributor of Edison storage batteries in Los Angeles will become resident manager. The Edison Storage Battery Supply Company also maintains two other offices on the Pacific Coast, one at 206 First street, San Francisco, in charge of District Manager, Mr. E. M. Cutting, and another at 65 Columbia street, Seattle, under F. C. Gibson as resident manager.

De Jongh & Cochran have opened offices for the Delco Light in the Crossley building, San Francisco. Their efforts are being concentrated on demonstrations at country fairs.

ELECTRICAL CONTRACTORS' NOTES.

The Pierce Tomlinson Electric Company installed the decorative lighting for the Home Chautauqua, now being conducted at the Armory.

The Ne Page, McKenny Company have secured contracts for installing the wiring in the new sugar refinery at Grants Pass, and the new concrete building at Seventh and Ankeny streets, being built by Percy Blythe.

The Smith McCoy Electric Company are about to commence to install a most complete and modern electric wiring system in the new mansion now being built by T. H. Wilcox, on Council Crest, Portland, this residence to cost $100,000.

HINTS ON SELLING ELECTRIC RANGES.

"The Truth and the Proof About Electric Cooking" is the title of an attractive booklet published by the Southern California Edison Company. It contains 26 letters from satisfied consumers, together with illustrations demonstrating that electric cooking is clean, easy, appetizing, dependable, efficient, sanitary, dainty, cool, safe, controlled and progressive.

"How to Sell an Idea," is a handbook for electric range salesmen published for free distribution by the Society for Electrical Development. Its excellent arguments are based on the thought that the "idea of electric cooking" is to be sold, and not merely an electric stove. Detailed directions are given which should prove of value to any salesman.

IMPRESSIVE PLANS FOR AMERICA'S ELECTRICAL WEEK.

The presidential campaign headquarters of either great party is not a whit busier place than the headquarters of the America's Electrical Week campaign. To care for the immense amount of detail work—such as the handling of fully six million pieces of publicity matter, the society has increased its staff for the "big drive."

E. M. Hunt, formerly advertising manager of the United Profiting Sharing Corporation, a subsidiary of the United Cigar Stores, has joined the society's staff under H. W. Alexander, director of publicity. Mr. Hunt's experiences include broad training gained through participation in national and retail selling campaigns of several lines of trade. Before coming with the society he made a general study of retail trade conditions in the electrical field.

F. C. Myers is now with the society's publicity staff as trade press editor and also in direct charge of its highway lighting campaign. Mr. Myers was for ten years identified with one of the leading publishing houses as managing editor of four of its publications.

Robert A. Jones has entered the engineering department of the society as statistician. Most of his time will be occupied with handling the comprehensive electric rate files which the society has compiled to assist its members.

Its regular staff, consisting of John T. Kelly, manager of the newspaper bureau, and Hill Griffith, manager of advertising service, remain with the society in charge of their respective departments. Grace T. Hadley will handle the publicity relating to home economics.

J. M. Wakeman, general manager, has executive charge of all society work. Harry W. Alexander, director of publicity, is directly in charge of the national campaigns and all publicity and sales work.

One of the executive staff of the society will visit practically every city of considerable size in the United States during this fall with the idea of having "Electrical Nights" in the interests of America's Electrical Week and the Society. At these gatherings electrical men, advertising men, Rotary Club members and others interested will be invited to attend. The society's staff member will deliver an interesting illustrated address on the progress of the campaign and how each individual can profit. Motion pictures on electrical subjects will be shown. The America's Electrical Week Local Committees in charge of the campaign will attend to the entertainment and the jollification.

The society invites electrical men everywhere interested in the movement who are not now receiving the important literature, sales helps, etc., to send us their names, to the New York headquarters. Nearly 25,000 names are already on the mailing list. More names are being added daily.

A new committee "How To" hand book just out entitled "How to Plan Your Work," has been mailed to 1500 local committeemen, Jovian officials and N. E. L. A. Sections. It details exactly how a committee can be formed to carry on campaigns in cities of 10,000 and under—cities of 10,000 to 50,000 and 50,000 and over.

The next "How To" booklet will be entitled "More Customers—More Sales—More Profits for You." It will be ready for distribution about September 25th. Its purpose will be to detail how each individual in the industry can participate with profit.

NEW BULLETINS AND CATALOGUES.

"The History and Development of Gold Dredging in Montana" is the title of Bulletin No. 121, just issued by the U. S. Bureau of Mines. The bulletin contains sixty pages and is well illustrated.

NEWS NOTES

FINANCIAL.

SALEM, ORE.—The annual report of the Pacific Telephone & Telegraph Company for the year ending June 30, 1916, filed with the Oregon Public Service Commission, shows that the company's total revenues in Oregon were $2,162,298.41, and that the total expenses were $1,674,011.54. The ratio of operating expenses to operating revenues in the state was 77.42 per cent. For the entire system the company's net income was $2,187,284.43. Dividends totaling $1,920,000 were paid. The system's total operating revenues were $19,477,308.84, and the total operating expenses were $13,850,062.51.

INCORPORATIONS.

SACRAMENTO, CAL.—The Southern California Edison Company has filed amended articles of incorporation, increasing the capital stock from $30,000,000 to $100,000,000.

RENO, NEV.—Prominent citizens of Nevada and Utah are identified with the Nevada Telephone & Signal Company, which has been incorporated under the laws of Nevada. The president of the company is F. M. Manson of Reno; Adrian Ellis is vice-president, and J. T. Goodin, treasurer. The plans of the new company include the making of wireless telephonic experiments in various parts of the state. The company is capitalized at $250,000, the par value of the shares being $100 each. Work on the new line has started at Winnemucca and will be rapidly pushed to completion.

ILLUMINATION.

SUPERIOR, MONT.—H. Schoenfeld and E. J. Edwards plan the installation of a small lighting plant.

SALEM, ORE.—The Keno Power Company plans to ask Klamath Falls for a franchise for furnishing the city with light.

RIDDLE, ORE.—At a recent election bonds in the sum of $21,000 were voted for the construction of a lighting and water system.

SANTA ROSA, CAL.—Women of the Magnolia Improvement Club have ratified the decision to install more lights in that district.

PETALUMA, CAL.—At a meeting of the citizens of the Wilson district a committee was appointed to investigate the formation of a lighting district.

IDAHO FALLS, IDAHO.—The city council has granted a new franchise to Mr. Wilcox for the construction of a gas plant. Work will begin at once.

RIVERDALE, CAL.—Sealed bids will be received up to October 3d for furnishing and maintaining all necessary apparatus for the Riverdale Lighting District.

NOVATO, CAL.—A mass meeting was held recently to discuss the matter of extending the electric light system to outside districts, and favorable action was taken.

TULARE, CAL.—The city trustees have received a petition asking them to form an assessment district to provide for a system of electric lights in the business portion of the city.

COLUSA, CAL.—A movement is on foot here for the establishment of a municipal electric light plant. The supervisors are now inspecting other municipal lighting plants in the state.

THREE FORKS, MONT.—The engineering firm of Swearington & McCulloh of Great Falls has made detailed plans for a complete sanitary sewer and a lighting system here, according to a recent announcement.

HOQUIAM, WASH.—This place is giving consideration to the question of a municipal lighting system and has employed F. S. Burrows of Spokane as consulting engineer to look into the matter.

DOUGLAS, ARIZ.—The city council has adopted a design for ornamental lighting poles for the new city lighting system. They will be cast iron, ten ft. 11 inches high, surmounted by a 16 in. globe.

RIVERSIDE, CAL.—The common council will receive sealed bids up to September 26th for the installation of one-light electric poles, conduits and lamps on Highland Place between Brocton avenue and Suman Tract.

ANCHORAGE, ALASKA.—The cost of the electric plant and power installation to be constructed here by the Alaskan Engineering Company will approximate $50,000 exclusive of the poles, the street lighting system, or the labor.

FRESNO, CAL.—A resolution of intention has been adopted by the trustees for the construction of an electrolier street lighting system upon each side of I street from Inyo to Los Angeles street and upon each side of Cherry avenue from Los Angeles to California street.

PHOENIX, ARIZ.—An ordinance has been adopted by the city commission ordering a special election to be held on October 23 submitting to the voters the proposition of issuing bonds in the sum of $600,000 for the purpose of providing an electric light and gas plant to be owned and controlled by the city.

TRANSMISSION.

HOOD RIVER, ORE.—The Pacific Power & Light Company of Portland will construct a high tower here from which to extend its line across the Columbia River.

KELSO, WASH.—According to Manager B. M. Atkins of the North Coast Power Company that company plans reconstruction of transmission lines in and near Kelso, work to start October 1st.

FRESNO, CAL.—A corps of engineers under R. C. Starr, hydraulic engineer for the Pacific Light & Power Company is now in the Big Creek region directing the work, in preparation for the raising of the dams at Huntington Lake.

MT. VERNON, WASH.—It is reported that active work will be started at once on the extension of the lines of the Pacific Traction Company. The first improvement will be made five miles south of Conway and construction will cost about $15,000.

ASTORIA, ORE.—Public service corporations have reached an agreement with the public on an ordinance requiring wires to be placed underground. The Pacific Power & Light Company will spend $50,000 in this work and the telephone company $20,000.

HONOLULU, T. H.—That negotiations are under way for the sale of the Island Electric Company of Mauri has been made public by Charles R. Forbes, chairman of the public utility commission. It is understood the purchaser is a contractor who has handled a number of large projects on the Coast.

SANTA FE, N. M.—A water power order of designation for hydroelectric purposes has been received by the U. S. Land Office here. The order designates and sets apart lands which may be used for the development and use in the transmission of water power for hydroelectric purposes. The lands designated are along Tulorosa River, Pecos River, Penasco River, Rio Grande, etc.

WOODLAND, CAL.—W. G. Decelle has succeeded Roy M. Pike as president of the Yolo Water & Power Company. Mr. Pike will be sent into the San Joaquin Valley to manage the Whitehall properties owned by White & Co. of New York, who are heavily interested in the Yolo Water & Power Com-

pany. The business office of the power company will be moved from San Francisco to Woodland.

EUGENE, ORE.—Plans for the improvements and extensions in the plants of the Oregon Power Company and the Northern Idaho & Montana Power Company were discussed at a recent conference in Eugene between H. M. Byllesby, head of H. M. Byllesby & Company, and the managers of the various plants. Definite plans for the improvements will be taken up within a month, according to Mr. Byllesby.

OROVILLE, CAL.—John A. Britton and several other officials of the Pacific Gas & Electric Company, were with Leo Vander Naillen, general manager of the Oro Electric Corporation, on a recent trip over the properties of the latter company in Butte county. The Pacific Gas & Electric Company expects an order from the railroad commission in 30 days confirming the transfer of the interests of the Oro Corporation to it.

VISALIA, CAL.—At a meeting of the directors of the Mt. Whitney Power Company G. C. Ward of Los Angeles was elected president; A. M. Kemp of Los Angeles, treasurer; Ben M. Maddox Susman Mitchell, W. R. Spalding, C. R. Blyth and E. R. Davis directors. Fred G. Hamilton is to be superintendent of the western division and Arch Robinson of the eastern division. R. E. Smith will be in charge of the sales department. R. E. Baker is secretary and R. C. Bulger auditor.

PORTLAND, ORE.—Legal papers filed in the Federal Court from the court of the Idaho district to complete title of the Electric Investment Company to power properties in Idaho, represent a case that involved more than $2,000,000. The sites, franchises and power plants of the Idaho-Oregon Light & Power Company, which are acquired by the Electric Investment Company through this case and its proceedings, are on the Snake River and other Idaho streams and serve a territory in Malheur and Baker counties in Oregon, besides a large territory in Idaho. The property was bought at public auction by the Electric Investment Company in Boise, on January 16, 1916.

LOS ANGELES, CAL.—Municipal ownership of the three distributing systems of the power companies in Los Angeles, these systems to be purchased on the partial-payment basis, using money now on hand to the extent of approximately $3,500,000 as a first payment, other payments to be made from the earnings of the municipal monopoly, and the power plants along the aqueduct to be developed with earnings from the same source, the power companies to sell at wholesale their excess power during this period of construction, is the plan of campaign which is being considered here. The plan is a consolidation of the suggestions made by the Chamber of Commerce, Councilman J. S. Conwell and Commissioner Boyle Workman, together with the recommendations filed by the Municipal League. Under the plan of the merger the distributing systems of the three companies will obviate the economic waste of paralleling, permit the city to own its own power and will do away with the necessity of a bond issue. While the amount of money to be offered the companies for their systems is a matter of future consideration, the general scheme contemplates purchasing the properties of the companies at a fair valuation, on an indeterminate basis, and provides for the protection of the companies' hydroelectric and steam-plant investments through the purchase of current from the companies at wholesale rates until such time as the earnings of the combined system under municipal ownership shall have paid for the three properties and also for the development of the aqueduct power plants. The present construction of the aqueduct plants only provides for approximately 50 per cent of the power needed in Los Angeles, while it is doubtful whether or not there is enough money on hand in the city's power fund to purchase outright even the Edison system under the most favorable decision which the Railroad Commission might hand down under a rehearing.

TELEPHONE AND TELEGRAPH.

BENSON, ARIZ.—Work has begun on a new telephone line between this city and Lordsburg, N. M.

SALINAS, CAL.—The Pacific Telephone & Telegraph Company has applied for a franchise to do a general telephone and telegraph business in this city. Sealed bids will be received for such a franchise up to October 16.

SAN BERNARDINO, CAL.—Work has been started by the Pacific Telephone & Telegraph Company which will practically eliminate overhead cables and wires. Work is also being done by the company in the residential sections. The estimated cost of the improvements is about $6,000.

SAN DIEGO, CAL.—The committee representing the first mortgage bondholders of the San Diego Home Telephone Company and the majority of bondholders and stockholders of that concern has obtained stock as well as bond control of the company's interests, and plans are being made for future development.

TRANSPORTATION.

CHICO, CAL.—The reorganization committee of the Northern Electric Railway has been here to gather data on the road and its property for its reorganization.

GRASS VALLEY, CAL.—General Manager George W. Starr of the Empire and Pennsylvania mines, has made public the plans of an electric road to connect the two mines. The road will be operated by an electric trolley system, and will be one mile long.

MARTINEZ, CAL.—That work will be started on the construction of the Martinez and Concord Interurban Electric Railway within the next few weeks was the statement of Judge Clifford McClellan, one of the promoters of the project when he was in Martinez recently. McClellan asserted that the contract for the grading is to be awarded immediately and that the grading work will be started on Escobar, Pine and Jones streets, and the Pacheco road.

IRRIGATION.

AMEDEE, CAL.—The landowners of the proposed Honey Lake Valley Irrigation district have decided for organization.

LAKEPORT, CAL.—A plan is under consideration which provides for the formation of an irrigation district in Big Valley.

TURLOCK, CAL.—At the special election in the Turlock Irrigation District the proposition to issue bonds in the sum of $162,478 for the upkeep and repair of the canals of the district was passed.

SACRAMENTO, CAL.—Major Paul M. Norboe, assistant state engineer, has been in Glenn county, investigating the land to be opened to irrigation, being a part of the plan to reorganize the Kuhn project.

WILLOWS, CAL.—The hearing on the petition of the farmers of the Jacinto and Princeton-Codora-Glenn sections for an election on the organization of two irrigation districts has been set by the supervisors for October 2, when it is expected the report of the state engineer on the feasibility of the propositions will be filed with the board. The Princeton-Codora-Glenn district contains an area of about 18,000 acres, the Jacinto having an area of more than 20,000.

OROVILLE, CAL.—After much discussion on the advantages and disadvantages of the proposed methods of furnishing irrigation to the lands south and southwest of Oroville, the committee named by the chamber of commerce decided in favor of the organization of an irrigation district. It was decided that a definite proposition would be offered to the Western Canal Company for the purchase of water in bulk, contingent upon the organization of an irrigation district. The plan is to take the water out of the east bank of the Feather River at a point opposite the Western Canal intake.

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	List.	Sell.
Wood Mats.		
For 1 switch	.30	.25
For 2 switch	.50	.30
For 3 switch	.70	.35
For 4 switch	.90	.45
For 5 switch	1.10	.55
For 6 switch	1.30	.65
For 7 switch	1.50	.75
For 8 switch	1.70	.85
Receptacles.		
10 Ampere Flush, Porcelain Plug, complete		1.50
10 Ampere Flush, Indes. Plug, complete		1.50
Screw Plug. 10 Ampere, complete		1.00
D. D. Flush, 10 Ampere, complete		2.00
D. D. Flush, 25 Ampere, complete		5.00
20 Amp. Flush, with Porcelain Plug, complete.		2.00
20 Ampere Flush, Polarity, with Strain Bushing, complete		2.50
10 Ampere Surface Type Heater Control, complete		....
Junior, complete		1.25
Junior, Large Round Plate, complete		2.00
Junior, Small Round Plate, complete		1.35
Bulls Eye with Cand. Lamp, complete		3.00
Bulls Eye with Regular Lamp, complete		4.10
Bulls Eye with Flush Switch, complete		4.50
Bulls Eye with Flush Receptacle, complete		4.00
Bulls Eye with Flush Receptacle and Flush Switch, complete		6.00
No. 465 Lamp and Indicating Switch, complete		3.50
Outlet and Sign Receptacles for Conduit.		
Keyless, Porcelain, 3¼ or 4-inch		.65
Keyless, Brass, 3¼ or 4-inch		.70
Weatherproof, Porcelain, 3 or 3¼-inch		.50
Weatherproof, Porcelain, 4-inch		.65
Keyless, Interchangeable		1.00
Key, Interchangeable		1.05
Pull Chain, Interchangeable		1.50
Pull Chain, No. 428		1.50
Mogul, 1500 Watt, Brass		2.00
Mogul, Porcelain, complete		1.50
Concealed Base Wall		.50
Moulding Base Wall		.50
Fielding Base Wall		.60
Polarity Wall, 20 Ampere		.70
Screw Ring for Signs		.20
Pony Sign		.20

The correctness of these suggested selling prices is not guaranteed by publisher. Suggestions for corrections are invited.

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Fold Here

PUNCH HERE PUNCH HERE

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		List.	Sell.
	Metal Mouding and Fittings—Each.		
478	4½ in. Two-Piece Rosette, Metal Cap.	.73	.85
479	4½ in. Two-Piece Rosette, Metal Cap.	.75	.90
480	36 in. Two-Piece Rosette, Metal Cap.	.62	.75
481	3½ in. Two-Piece Rosette, Metal cap.	.64	.80
482	4½ in. Fixture, Metal Cap	.78	.90
483	4½ in. Fixture, Metal Cap	.80	1.00
484	3½ in. Fixture, Metal Cap	.64	.80
485	3½ in. Fixture, Metal Cap	.66	.80
571	Box Cover Recep., for 4 in. Cond. Box, Metal Cap	.52	.70
573	Box Cover Recep., for 4 in. Cond. Box, All Porcelain	.45	.60
575	Box Cover Recep. for 3 in. Cond. Box, Metal Cap	.39	.50
577	Box Cover Recep. for 3 in. Cond. Box, All Porcelain	.34	.45
579	Box Cover Cord Rosette, for 4 in. Cond. Box, Metal Cap	.56	.70
581	Box Cover Cord Rosette for 3 in. Cond. Box, Metal Cap	.45	.60
583	Box Cover Fixture Rosette for 3 in. Cond. Box, Metal Cap	.60	.75
585	Box Cover Fixture Rosette for 4 in. Cond. Box, Metal Cap	.48	.60
2250	Female Stud, ¼ in.—Per C	5.50	7.00
2251	Male Stud, ⅜ in.—Per C	5.00	7.00
2252	Male Stud, ½ in.—Per C	6.50	7.00
2253	Female Stud, ⅜ in.—Per C	7.00	8.00
	Moulding Wood. Per 1000.		
	2 Wire, Plain	30.00	30.00
	2 Wire, Painted	40.00	40.00
	3 Wire, Plain	45.00	45.00
	3 Wire, Painted	60.00	60.00
	Wood Moulding Fittings.		
	2 Wire, Single Branch	.30	.30
	3 Wire, Single Branch	.45	.45
	3 to 2 Wire, Single Branch	.40	.40
	3 to 2 Wire, Double Branch	.60	.60
	2 Wire, Double Branch	.45	.45
	2 Wire, Angle	.50	.50
	3 Wire Angle	.60	.60
	2 Wire Corner	.30	.30
	2 Wire Crossing, 2W Crossover	.15	.15
	3 Wire Crossing, 3W Crossover	.20	.20
	2 Wire Crossing, 2W Crossover	.20	.20
	3 Wire Crossing. 2W Crossover	.20	.20
	2 Wire Connections	.25	.25
	3 Wire Connections	.35	.35
	Single Crossover	.06	.06
	Wood Rosettes	.10	.10

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